Sheet 1

1 Which of the following statements are not true of the line parameters R, L, G, and C?

(a) R and L are series elements.

(b) G and C are shunt elements.

(c) $G = \frac{1}{R}$.

(d) $LC = \mu\varepsilon$ and $RG = \sigma\varepsilon$.

(e) Both R and G depend on the conductivity of the conductors forming the line.

(f) Only R depends explicitly on frequency.

(g) The parameters are not lumped but distributed.

2 For a lossy transmission line, the characteristic impedance does not depend on

(a) The operating frequency of the line

(b) The length of the line

(c) The load terminating the line

(d) The conductivity of the conductors

(e) The conductivity of the dielectric separating the conductors

3 Report

D13.1. At an operating radian frequency of 500 Mrad/s, typical circuit values for a certain transmission line are: $R = 0.2\,\Omega/\text{m}$, $L = 0.25\,\mu\text{H/m}$, $G = 10\,\mu\text{S/m}$, and $C = 100\,\text{pF/m}$. Find: (a) α; (b) β; (c) λ; (d) v_p; (e) Z_0.

Ans. 2.25 mNp/m; 2.50 rad/m; 2.51 m; 2×10^8 m/sec; $50.0 - j0.0350\,\Omega$.

4

A lossless transmission line is 80 cm long and operates at a frequency of 600 MHz. The line parameters are $L = 0.25\,\mu\text{H/m}$ and $C = 100$ pF/m. Find the characteristic impedance, the phase constant, the velocity on the line, and the input impedance for $Z_L = 100\,\Omega$.

5 An air line has characteristic impedance of 70 Ω and phase constant of 3 rad/m at 100 MHz. Calculate the inductance per meter and the capacitance per meter of the line.

6- Calculate the charactrestic impedance , propagation constant , constant and velocity of propagation at $400Kc/s$ for transmission line having $L = 0.5mH/Km$,$C = 0.08uf/Km$ and negligible R and G.